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| EXAMINER |
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EDWARDS, PATRICK L

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| ART UNIT | PAPER NUMBER |
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2624

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS                               | 12/29/2006 | PAPER         |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/071,405

Applicant(s)

GERRITSEN ET AL.

Examiner

Patrick L. Edwards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

1. The response received on 10-05-2006 has been placed in the file and was considered by the examiner. An action on the merits follows.

#### ***Response to Arguments***

2. The arguments filed on 10-05-2006 have been fully considered. A response to these arguments is provided below.

### **Specification Objection**

#### **Summary of Argument:**

The specification was previously objected to because it lacks headings for:

- Background of the Invention
- Summary
- Brief Description
- Detailed Description

Further, the specification was objected to because of the lack of a statement such as "We claim" before the claims.

Applicants have "respectfully decline[d] to add these headings as these are not required under MPEP 608.01(a)

#### **Examiner's Response:**

The examiner respectfully disagrees with this reading of 608.01(a), whatever that reading may be. The examiner has read this section, and has come up with the opposite interpretation. Specifically, ¶ 6.02 "Content of the Specification" appears to expressly require that the specification contain the listed headings. Therefore, the objection to the specification is repeated.

### **Prior Art Rejections**

#### **Summary of Argument:**

Appellant admits that Shiffman discloses slicing of the image volume, but alleges that Shiffman fails to expressly disclose that the slices are reconstructed (arguments pgs. 4-5).

#### **Examiner's Response:**

The Patent Office is charged with the task of giving claims their broadest reasonable interpretation. The federal circuit has repeatedly held that the office is not to read limitations from the spec into the claims. Here, it is not clear what limitations the applicant wishes to read into the claims. Applicant has not argued for a specific interpretation of "reconstructing" that would evade Shiffman. Rather, applicant has simply stated that the slices in Figure 9 have

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not been reconstructed. The examiner respectfully disagrees. The slice shown in Figure 9 and described at col. 8 is a reconstructed slice because it is formed after the image volume has been generated.

*Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiffman et al. (PN 6,424,732). (hereinafter Shiffman)

Regarding Claim 1: Shiffman discloses a method of processing images to identify regions of interest within a multi-dimensional data set, comprising the steps of:

- Acquiring image data in such a way that individual images succeed one another in a direction of succession (col. 6 lines 8-10) [The individual images are the 2-dimensional images (Fig. 2, 21, 26, and 32) and the direction of succession is the time dimension as is inherent in CT imaging.],
- Constructing a multi-dimensional data set is constructed from the individual images (col. 8 lines 4-5) [The multi-dimensional data set is the 3-dimensional volume (Fig. 8, 42) that results from stacking the 2-dimensional images (21, 26, 32).],
  - which multi-dimensional data set assigns data values to positions in a multi-dimensional space (col. 6 lines 61-62) [The image volume (42) assigns intensity levels to all points in a 3-dimensional space.],
  - established by the direction of succession and two directions parallel to the surface of the individual images (Fig. 8) [Figure 8 shows the direction of succession which is represented by the arrow to the left of the image volume (42). It also shows the cross sections belonging to the different 2-dimensional images (21, 26, 32). Observing this figure it is clear that the cross sections are stacked on top of one another in the direction of succession. The two directions parallel to the surface of the individual images are the two directions of the 2-dimensional images (21, 26, 32) which are not shown but understood to be the direction across the width of the figure and the direction into the figure.],
- reconstructing a slice through the multi-dimensional data set along a cut plane through the multi-dimensional space (col. 8 lines 15-17) [The reconstructed slices are represented by the 2-dimensional

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planes {note these are referred to as 2-dimensional planes and not 2-dimensional images (21, 26, 32)} as shown in Figure 9.] such that, the direction of the cut plane has a component in the direction of succession (col. 8 line 17) [The cut plane is the direction in which the image volume (42) is sliced. Shiffman discloses that the slicing can be done in any direction, which means the direction of the cut plane can have a component in the direction of succession. In figure 9, the slices in the top left have a cut plane in the Y-Z directions, the slices in the top right have a cut plane in the X-Z directions, and the bottom slices have a cut plane in the X-Y directions.], and

- locating a region of interest on the basis of the cut plane (col. 9 lines 21-25) [The region of interest is the object that is composed of the cross-sections ascertained from the 2-dimensional planes which are the slices defined by the cut plane.].

The analogous arguments of claim 1 are applicable to claims 7, 8, and 9.

Regarding Claim 2: A method of processing images as claimed in claim 1, in which:

- Segmentation of a region of interest from the one or more relevant images is performed in one or more of the individual images (col. 8 lines 20-28). [The images are segmented by deciding which cross-sections belong to which objects. Multiple objects (Fig. 8, 13, 14, and 11 {which should be 16}) may be in one region of interest (Fig. 8, 42).]
- Such segmentation is performed on the basis of information in the reconstructed slice along the cut plane through the multi-dimensional data set (col. 8 lines 34-37). [The segmentation is done based on the results of modeling cross-sections with functions that allow for comparison. Area is the type of information in the reconstructed slice or 2-dimensional plane that is used for segmentation.]

Regarding Claim 3: Shiffman discloses a method of processing images as claimed in claim 2, in which:

- An edge is located in the reconstructed slice (col. 8 lines 37-40). [The contours of the cross-sections within the 2-dimensional planes are determined.]
- The segmentation of the region of interest in the one or more images is performed on the basis of the location of the edge found in the relevant image (col. 9 lines 1-6). [The contours are used to find the area of the cross-sections and based on the area the cross-sections are grouped together to segment the region of interest.]

Regarding Claim 4: Shiffman discloses a method of processing images as claimed in claim 3, in which:

- Respective slices through the multi-dimensional data set are reconstructed along a plurality of cut planes through the multi-dimensional space (col. 8 lines 15-17). [The reconstructed slices are represented by the 2-dimensional planes {note these are referred to as 2-dimensional planes and not 2-dimensional images (21, 26, 32)} as shown in Figure 9.]
- The directions of the individual cut planes have components in the direction of succession (col. 8 line 17). [The cut plane is the direction in which the image volume (42) is sliced. Shiffman discloses that the slicing

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can be done in any direction, which means the direction of the cut plane can have a component in the direction of succession. In figure 9, the slices in the top left have a cut plane in the Y-Z directions, the slices in the top right have a cut plane in the X-Z directions, and the bottom slices have a cut plane in the X-Y directions.]

- Individual edges are tracked in the individual slices (col. 6 lines 43-45). [The isolabel contours of the cross-sections within the 2-dimensional planes are tracked by intensity thresholding.]
- And the segmentation of the region of interest in the one or more images is performed on the basis of the individual locations of the respective edges found in the relevant image (col. 9 lines 1-6). [The contours are used to find the area of the cross-sections and based on the area the cross-sections are grouped together to segment the region of interest.]

*Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiffman in view of Han et al. (PN 5,457,754). (hereinafter Han)

Regarding Claim 5: Shiffman discloses a method of processing images as claimed in claim 4. Shiffman discloses the finding the boundaries of a region of interest but assumes that this boundary would be continuous and therefore does not disclose the use of interpolation. However, Han discloses a method for automatic contour extraction of a cardiac image in which:

- A boundary of the region of interest is derived by interpolation between the individual locations in the relevant image of the respective edges found (col. 16 lines 19-23). [Interpolation is used to create a continuous boundary as shown in Figures 28a, 28b, and 28c.]

It would be obvious to one skilled in the art to modify Shiffman with the process of interpolation as taught by Han because Shiffman stresses the importance of accurately determining the contours (col. 8 lines 40-44). Furthermore one would be motivated to make this modification to improve the accuracy of the boundary because as Han explains noise and discontinuities negatively impact the determining of the boundary. Han explains how interpolation is used in medical imaging, specifically of the heart, to account for these factors.

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Regarding Claim 6: Shiffman discloses a method of processing images as claimed in claim 5. Shiffman discloses the finding the boundaries of a region of interest but assumes that this boundary would be continuous and therefore does not disclose the use of interpolation. However, Han discloses a method for automatic contour extraction of a cardiac image in which:

The interpolation is performed inter alia on the basis of a priori information concerning the region of interest (23-26). [The a priori information is used to ensure the contours are not just continuous but meaningful as well.]

*Conclusion*

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (571) 272-7390. The examiner can normally be reached on 8:30am - 5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards

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JINGGE WU  
SUPERVISORY PATENT EXAMINER